1. DNEPROVSKIY, A.

2. USSR (600)

4. Drill (Agricultural Implement)

7. Advantages of checkrow planting.
Dost. sel'khoz. No. 2. 1952

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TEMNIKOVA, T.I.; DNEPROVSKIY, A.S.

Chemical transformations of α-halo ketones. Part 10: Interaction of dibenzoylbromomethane with nucleophilic reagents. Zhur. ob. khim. 34 no.9:2845-2847 S '64. (MIRA 17:11)

1. Leningradskiy gosudarstvennyy universitet.

DNEPROVSKIY, S. P.

Sbornik zadach i primerov po kursu ekonomiki i planirovaniia sovetskoi kooperativnoi torgovli [Collected problems and examples for a course in the economics and planning of Soviet cooperative trade]. Moskva, Izd-vo TSentrosoiuza, 1953. 275 p.

SO: Monthly List of Russian Accessions, Vol 6 No 6 September 1953

DNEPROVSKIY, Stepan Petrovich; KAZARIN, F.V.; VARDIYEVA, K.I.

[A collection of problems for a course in financing and crediting of consumers' cooperatives] Sbornik zadach po kursu finansirovaniia i kreditovaniia potrebitel'skoi kooperatsii. Pod red. S.P.Dneprovskogo. Moskva, TSentrsoiuz, 1955. 91 p. (MIRA 10:11)
(Cooperative societies--Finance)

BOGACHEVSKIY, Mikhail Borisovich, prof., doktor ekonom.nauk; BYKOV, Artemiy Konstantinovich, dotsent, kand.ekonom.nauk; DNEPROVSKIY, Stepan Petrovich, prof.; YAMPOL'SKIY, Moisey Markovich, kand. ekonom.nauk; BUCHKIN, B.I., red.; BILENKO, L.S., red.izd-va; FOMICHEV, P.M., tekhn.red.

[Financing and crediting of the consumers' cooperative societies of the U.S.S.R.] Finansirovanie i kreditovanie potrebitel'skoi kooperatsii SSSR; uchebnik dlia vuzov. Moskva, Izd-vo TSentrosoiuza, 1959. 465 p. (MIRA 13:4)
(Cooperative societies--Finance)

SEREBRYAKOV, S.V., prof., doktor ekonom.nauk; GOGOL', B.I., dotsent; LIFITS, M.M., prof.; FEFILOV, A.I., dotsent; KISTANOV, Ya.A., dotsent; GENKINA, L.S., dotsent; VASIL'YEV, S.S., dotsent; DNEPROVSKIY, S.P., prof.; PIROGOV, P.V., dotsent; SMOTRINA, N.A., dotsent; KULIKOV, A.G., dotsent; KUZIN, N.I., dotsent; PISKUNOV,V. red.; MUKHIN, Yu., tekhn.red.

[Economics of Soviet commerce] Ekonomika sovetskoi torgovli; uchebnoe posobie. Moskva, Gos.izd-vo polit.lit-ry, 1959. 478 p. (MIRA 12:12)

(Russia--Commerce)

GRIGOR'YAN, G.S.[Hryhor'ian, H.S.], dots.; KISTANOV, Ya.A., dots.; FEFILOV, A.I., dots.; GENKINA, L.S.[Henkina, L.S.], dots.; VASIL'YEV, S.S.[Vasil'iev, S.S.], dots.; SEREBRYAKOV, S.V., prof.; DNEPROVSKIY, S.P.[Dnieprovs'kyi, S.P.], prof.; PIROGOV, P.V.[Pyrohov, P.V.], dots.; GOGOL', B.I.[Hohol', BI.], dots.; SMOTRINA, N.A., dots.; KULIKOV, O.G.[Kulikov, O.H.], dots.; KUZIN, M.I., dots.; DEMIDYUK, V.F.[Demydiuk, V.F.], red.; SKVIRSKAYA, M.P.[Skvyrs'ka, M.P.], red.; LEVCHENKO, O.K., tekhn. red.; SERGEYEV, V.F.[Serhieiev, V.F.], tekhn. red.

[Soviet trade economics] Ekonomika radians'koi torhivli; pid-ruchnyk. [By] G.S.Grigor'ian ta inshi. Kyiv, Derzhpolitvydav URSR, 1962. 500 p. (MIRA 16:11)

(Russia--Commerce)

GRIGOR'YAN, G.S., prof.; KISTANOV, Ya.A., prof.; FEFILOV, A.I., dots.; GENKINA, L.S., dots.; VASIL'YEV, S.S., dots.; SEREBRYAKOV, S.V., prof.; DNEPROVSKIY, S.P., prof.; PIROGOV, P.V., dots.; GOGOL', B.I., doktor ekon. nauk; SMOTRINA, N.A., dots.; KULIKOV, A.G., prof.; KUZIN, N.I., dots.[deceased]; AVETISYAN, Ye., red.; MUKHIN, Yu., tekhn. red.

[Economics of Soviet trade] Ekonomika sovetskoi torgovli; uchebnik. 2., dop. izd. Moskva, Politizdat, 1963. 519 p. (MIRA 16:12)

(Russia--Commerce)

DNEPROVSKIY, I. S.

5(2) PHASE I BOOK EXPLOITATION SOV/1727

Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii

Redkozemel'nyye elementy; polucheniye, analiz, primeneniye (Rare Earth Elements; Extraction, Analysis and Application) Moscow, Izd-vo AN SSSR, 1958. 331 p. 2,200 copies printed.

Resp. Ed.: D. I. Ryabchikov, Professor; Editorial Board: I. P. Alimarin, Corresponding Member, USSR Academy of Sciences, I. N. Zaozerskiy, Doctor of Chemical Sciences, R. V. Koglyarov, Candidate of Technical Sciences, V. I. Kuznetsov, Doctor of Chemical Sciences, M. M. Senyavin, Candidate of Chemical Sciences, and Yu. S. Sklyarenko, Candidate of Chemical Sciences; Eds. of Publishing House: D. N. Trifonov and T. G. Levi; Tech. Ed.: S. G. Markovich.

PURPOSE: This book is intended for scientists, chemists, teachers and students of higher educational institutions, chemical and industrial engineers, and other persons concerned with the extraction, preparation, use, or study of rare earth elements.

COVERAGE: This collection contains reports presented at the June 1956 Conference on Rare Earth Elements at the Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences USSR. The articles treat chemical methods of separating rare earth mixtures, methods of processing rare earth ores, ion exchange chromatography, chemical analysis, and some industrial applications of rare earths. Aside from contributing authors, the editors mention the following Soviet scientists, who are studying rare earth elements, rare earth deposits, extraction methods, and the preparation of oxides and salts: Martynov, Mel'nikov, Khrushchov, Melikov, Pisarzhevskiy, Chernyak, Tanatar, Belousov, Zhukov and especially, N. A. Orlov, who first obtained the majority of rare earth elements in the pure state, separated many complex molecular compounds of these elements, and determined their specific properties. References are given at the end of each article.

TABLE OF CONTENTS:

Rare Earth Elements; Extraction (Cont.) SOV/1727

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(17)

SOV/48-22-8-6/20

AUTHORS: Dneprovskiy, I. S., Kolesov, G. M.

TITLE: Conversion Electrons of Some Neutron-Deficient Ho- and Er-Isotopes (Konversionnyye elektrony nekotorykh neytronodefitsitnykh izotopov Ho i Er)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol. 22, Nr 8, pp. 935 - 940 (USSR)

ABSTRACT: The absence of Tu-lines in the conversion spectra of the isotopes of the erbium fraction permitted to regard the sample as being sufficiently pure. Tu was well studied by Gromov et al.(Ref 7) under similar conditions. 4 groups of lines with a half-life of $T_{1/2} \sim 30$, 3,5, 2,5 and 1 hours were found. The experimental evidence concerning the lines with $T_{1/2} \approx 30$ hours (Table 1) well agrees with the information furnished by the papers given by references 2 and 3. Hence they can be ascribed to the transitions following the decay of Ho^{160}. The investigation of this well studied isotope was not within the scope of this paper. In spite of a short irradiation of the tantalum it stood out sufficiently clear to permit an identification of the lines. The erbium-isotope

which decays with $T_{1/2}$ = 3,5 hours was found by Handley (Khandley) and Olson (Olson)(Ref 5). Mitchel(Mitchel) and Templeton(Templton)(Ref 8) determined the mass number (A) of this isotope according to the time of passage through the mass spectrometer as 161. It can be assumed that the lines found by the authors which decay with such a half-life can be ascribed to the transitions of the decay of Er^{161} and of his daughter isotope Ho^{161}. The Ho^{161} with $T_{1/2}$ = 2,5 hours is known. Nevertheless this transition cannot be assigned to this isotope. According to the experimental conditions the observed half-life should be equal to 3,5 hours (Er^{161}). Hence the existence of an Er-isotope with a half-life of 2,5 hours seems to be most probable. A number of lines was also found which exhibited a half-life of about 1 hour. The investigation of these lines with the spectrometer at hand met with difficulties. The existence of 3 lines was reliably determined (Fig 4, Table 8). The authors expressed their gratitude to K.Ya.Gromov and A.V. Kalyamin. There are 4 figures, 9 tables, and 9 references, Conversion Electrons of Some Neutron-Deficient Ho- and Er-Isotopes SOV/48-22-8-6/20

4 of which are Soviet.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii im.V.I.Vernadskogo Akademii nauk SSSR (Institute of Geochemistry and of Analytical Chemistry imeni V.I.Vernadskiy, AS USSR)

Card 3/3

5(2) PHASE I BOOK EXPLOITATION SOV/2402

Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii

Redkozemel'nyye elementy; polucheniye, analiz, primeneniye (Rare Earth Elements; Production, Analysis, and Use) Moscow, Izd-vo AN SSSR, 1959. 351 p. 5,000 copies printed.

Resp. Ed.: D. I. Ryabchikov, Professor; Eds. of Publishing House: D. N. Trifonov and T.G. Levi; Tech. Ed.: S. G. Markovich; Editorial Board: I. P. Alimarin, Corresponding Member, USSR Academy of Sciences, I. N. Zaozerskiy, Doctor of Chemical Sciences, R. V. Kotlyarov, Candidate of Chemical Sciences, V. I. Kuznetsov, Doctor of Chemical Sciences, M. M. Senyavin, Candidate of Chemical Sciences, and Yu. S. Sklyarenko, Candidate of Chemical Sciences.

PURPOSE: This book is intended for chemists in general and for geochemists and analytical chemists in particular.

COVERAGE: This collection of articles consists of reports presented at the Rare Earth Elements Symposium held in June 1956 at the Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy. The book may be divided into three sections: the characteristics, uses and production of rare earth elements (RZE); the methods of analyzing RZE; and the application of individual rare earth elements and RZE mixtures in the glass and metallurgical industries, and their use as catalysts. Considerable space is devoted to the application of ion-exchange chromatography in the production of pure forms of all rare earth elements. The combination of this method with other methods in separating RZE on an industrial scale are discussed by D. I. Ryabchikov, Yu. S. Sklyarenko, and M. M. Senyavina. Chemical methods of separating RZE compounds are discussed by I. N. Zaozerskiy (who is said to be the first in the USSR to develop methods of processing RZE), . V. P. Kotlyarov, L. F. Andreyeva, A. V. Nikolayev, and G. P. Aleksandrov. Quantitative X-ray spectral analytical methods are described by E. Ye. Vaynshteyn, and chemical methods of analysis by I. P. Alimarin and F. I. Pavlotskaya. The determination of RZE impurities in pure products and atomic materials are discussed at length in three articles by A. N. Zaydel' and his associates. All articles are accompanied by photographs, diagrams, tables, and bibliographic references.

AVAILABLE: Library of Congress

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77213
SOV/89-8-1-7/29

AUTHOR: Dneprovskiy, I. S.

TITLE: New Isotopes of Erbium and Holmium. Letter to the Editor

PERIODICAL: Atomnaya energiya, 1960, Vol 8, Nr 1, pp 46-47 (USSR)

ABSTRACT: The author investigated spectra of conversion electrons of erbium isotopes obtained by bombarding tantalum with 660 mev protons from the OIYaI synchrocyclotron. Spectra were investigated by means of a $\pi\sqrt{2}$ focusing β spectrograph type BPP-1. Observing at a solid angle 0.4% of 4π of a 1 x 30 mm source, the resolving power of the Ba^{137} K-661.6 line was 0.2-0.25%. Magnetic field measurements were performed by means of a special flux meter which enabled measurements of conversion lines with a half-life of 15 min and better. Errors of energy determination were from 0.1 to 0.3%. Among more than 100 conversion lines belonging to the neutron-deficient isotopes of erbium and holmium one observes a

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New Isotopes of Erbium and Holmium. Letter to the Editor

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group with a half-life $T_{\frac{1}{2}}$ = 1.4 hr. The table below contains their identification.

Gamma-Transition in Nuclei of Erbium and Dysprosium

hv kev	$T_{\frac{1}{2}}$, hr	Change of nucleus from which transition originates	Multipole character
98.6	2.4 ± 0.1	66	E2
218.2	2.5 ± 0.1	66	-
320.5	2.4 ± 0.1	66	E2 or M3
357.1	2.4 ± 0.1	66	-
387.3	2.4 ± 0.1	67	-
945.9	2.5 ± 0.1	-	-
948.5	2.5 ± 0.1	-	-

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Separating holmium from the erbium fraction, 2 hr after the latter was separated from tantalum, the intensity of the line corresponding to a γ -transition of the dysprosium nucleus decreases to a half in (27 ± 2) min. From the above facts the author deduces the existence of the following chain:

$$\mathrm{Er} \xrightarrow{2.4 \text{ hr}} \mathrm{Ho} \xrightarrow{27 \text{ min}} \mathrm{Dy}.$$

Energy and intensity relations allow identification of the energy levels as $E_1 = 98.6$ kev (2^+) and $E_2 = 316.8$ kev (4^+) of the first rotational band of the even-even nucleus of dysprosium. According to Dzhelepov and Peker (Deformirovannye yadra v oblasti Nd-Os. Dubna, 1958), one can deduce from the relation between the position of the first excited level and the number of neutrons that the mass number of the members of the chain is A = 158. From the position of the first two energy levels one gets for the constants in the energy equation $E = AI(I+1) - BI^2(I+1)^2$ the values $A = 16.7 \pm 0.35$ and $B = 0.042 \pm 0.008$.

New Isotopes of Erbium and Holmium
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B. S. Dzhelepov and K. Ya. Gromov were consulted, and they discussed the results, while I. A. Yutlandova and Yu. V. Narseyeva did the chemical separation of the samples. There is 1 table; and 3 Soviet references.

SUBMITTED August 13, 1959

Card 4/4

84711

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B006/B056

24.6720

AUTHORS: Dneprovskiy, I. S., Nemet, L., Peker, L. K.

TITLE: The Decay of Er^{161} 19

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 1(7), pp. 13-15

TEXT: After a short introductory discussion of the results obtained by other authors when investigating the transition energies of Er^{161}, the authors of the present paper give a report on their own results. For the purpose of explaining the nature of the transition $h\nu$ = 826 kev of Er^{161}, they bombarded tantalum with 660-Mev protons from the synchrocyclotron of the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research) and investigated the radiation accompanying the erbium decay by means of a scintillation spectrometer and a double focusing β-spectrometer. The half life of this transition was measured as amounting to (190±10) min, the energy determination gave a value of (826.5±1.5) kev. For the purpose of determining the conversion coefficient

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The Decay of Er^{161}

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of this transition, the electron conversion line ratio and the ratio of the photopeaks of the gamma spectrum of this transition and of the 661.6-kev transition of the Ba^{137} nucleus had to be measured. In this connection it was necessary to take the radiations of the two isotopes Er^{160} and Er^{158}, which also existed in the preparation, into account; the greatest correction was furnished by the gamma transitions 848 and 851 kev of the Ho^{158}-decay. In an earlier paper, these transitions had already been investigated and had been identified as E2-transitions between the second and the first rotational band. The intensity ratio $I_{\gamma 826}/I_{\gamma 848,851}$ was determined as amounting to 4.0 ± 0.2. If all corrections are taken into account, $\alpha_K = 0.008 \pm 0.002$ was obtained for the K-conversion coefficient of the 826-kev transition. According to the tables by L. A. Sliv and N. I. Band, this gamma transition is of the type M1 or E3. In order to arrive at a decision, the intensity ratio of the conversion lines K/L was measured and a value 7.0 ± 0.8 was obtained, which excludes the E3-type. The intensity ratio of the gamma transitions 211 and 826 kev was measured as

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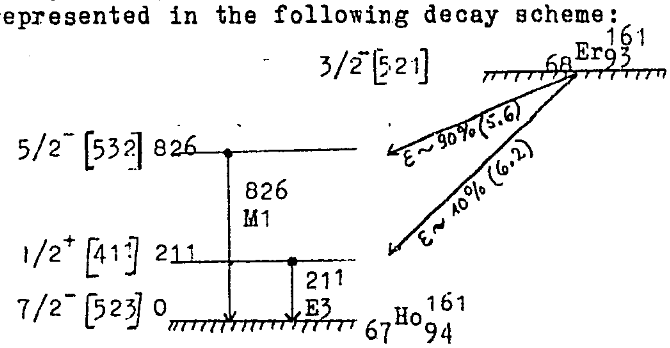
amounting to $I_{\gamma\ 826}/I_{\gamma\ 211} = 8.0 \pm 1.5$. All results obtained by measurements are represented in the following decay scheme:



The authors finally thank I. A. Yutlandov and S. Khaynatskiy for carrying out the chemical work. There are 1 figure and 9 references: 4 Soviet and 5 US.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii Akademii nauk SSSR (Institute of Geochemistry and Analytical Chemistry of the Academy of Sciences, USSR)

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B006/B056

The Decay of Er^{161}

SUBMITTED: January 14, 1960

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Card 4/4

GROMOV, K.Ya.; DNEPROVSKIY, I.S.

Study of conversion electron spectra of neutron-deficient erbium and holmium isotopes. Izv. AN SSSR. Ser. fiz. 25 no.9:1105-1114 '61. (MIRA 14:8)

1. Ob"yedinennyy institut yadernykh issledovaniy i Institut geokhimii i analiticheskoy khimii im. V.I. Vernadskogo AN SSSR.

(Internal conversion(Nuclear physics))
(Erbium—Isotopes)
(Holmium—Isotopes)

DNEPROVSKIY, V., kapitan-1 pomoshchnik mekhanika

Pechora needs a fleet of passenger vessels. Rech.transp. 23 no.9:58-59 S '64.
(MIRA 19:1)

1. Pecherskoye parokhodstvo.

DNEPROVSKIY, V. M.

V. M. Dneprovskiy, "On the choice of the intermediate frequency of a superheterodyne receiver." Scientific Session Devoted to "Radio Day", May 1958, Trudrezervizdat, Moscow, 9 Sep. 58.

An investigation of the influence of combination components of the mixer current on the operation of a superheterodyne receiver permits simple expressions which determine the choice of the intermediate frequency to be obtained. It is shown that it is possible to avoid reception on additional channels only for a limited number of combination frequencies.

A comparative estimate is given of two methods of forming the basic intermediate frequency signal (f_r f_s and f_r f_s) in terms of the degree of the effect of the congination frequencies on the operation of the superheterodyne receiver.

As particular cases of the analysis, recommendations are given for the choice of the intermediate frequencies of an unadjusted superheterodyne receiver, an adjusted superheterodyne receiver with a tuned preselector, a tuned superheterodyne with an untuned wideband preselector and a superheterodyne receiver with multiple frequency conversion.

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80164
S/108/60/015/04/06/007
B014/B014

AUTHOR: Dneprovskiy, V. M.

TITLE: The Effect of the Combined Current Components of a Mixer on the Selection of the Intermediate Frequency

PERIODICAL: Radiotekhnika, 1960, Vol. 15, No. 4, pp. 63 - 72

TEXT: In the paper under review, the author describes a universal method used to analyze the effect of the combined current components of a mixer on the selection of the intermediate frequency. A survey of the general conditions is given in the first part. Equations (10), (11), and (17), (18) are developed, which permit to estimate the number of superfluous channels by the proper selection of an intermediate frequency. It is, however, not possible to work out general recommendations for this purpose, but only for each individual type of mixer and receiver. Crystal mixers have the largest number of combination frequencies. Calculated and experimental data for typical modes of operation of such mixers are summarized in Table 1. Superheterodyne receivers as well as the demands made on the preselector and the width of the range of intermediate frequencies are studied in great detail. Next, the author describes an improved

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The Effect of the Combined Current Components of a Mixer on the Selection of the Intermediate Frequency S/108/60/015/04/06/007 B014/B014

superheterodyne with unmodified broad-band preselector. The limits of intermediate frequencies calculated here are summarized in Table 2. On this basis the author explains how it is possible to avoid superfluous channels. The last part of the article is devoted to the multiple conversion of frequencies. Two cases are described in which this frequency conversion is used. In the first case, good selectivity is intended to be warranted with respect to the mirror and additional channels, while spectrum analyzers are used in the second case. Analogous conditions for the selection of intermediate frequencies are derived. There are 3 figures, 2 tables, and 2 Soviet references.

SUBMITTED: January 12, 1959

Card 2/2

L 07276-67 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) JD/AT

ACC NR: AP6025280 SOURCE CODE: UR/0188/66/000/003/0128/0130

AUTHOR: Dneprovskiy, V. S.; Parygin, V. I.

43
B

ORG: Department of Oscillation Physics, Moscow State University (Kafedra fiziki kolebaniy, Moskovskiy gosudarstvennyy universitet)

TITLE: Influence of electric field on the edge of the main optical absorption band in semiconducting single crystals CdS_xCdSe_{1-x}

SOURCE: Moscow. Universitet. Vestnik. Seriya III. Fizika, astronomiya, no. 3, 1966, 128-130

TOPIC TAGS: cadmium compound, absorption edge, absorption coefficient, electric field

ABSTRACT: The authors investigated samples of semiconductor single crystal mixtures CdS_xCdSe_{1-x}, in which the absorption edge can be located in the wavelength region 0.5 - 0.7 μ, depending on the composition. The samples were made in the form of polished bars measuring 8 x 2 x 1.5 mm with contacts deposited on the end faces. The high resistivity of the samples ($\rho \sim 10^{10}$ ohm-cm) made it possible to produce in the crystals constant fields up to 3×10^4 v/cm. The shift of the absorption edge for the crystal $CdS_{0.5}CdSe_{0.5}$, by 30 Å, was observed at somewhat lower value of the external field and for the crystal $CdS_{0.7}CdSe_{0.3}$, apparently due to the larger slope of the absorption edge of the sample employed. The results show also that the absorption coefficient increases in near-parabolic fashion with increasing electric field. The inertia of the effect will be the subject of further study. The crystals were grown by Ye. A. Muzalevskiy. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 01Sep65/ ORIG REF: 003/ OTH REF: 002

Card 1/1

UDC: 621.315.593: 535

L 26131-66 EWT(1)/EWP(e)/EWT(m) IJP(c) GG/WH

ACC NR: AP6015799

SOURCE CODE: UR/0386/66/003/010/0385/0389

67
65

AUTHOR: Dneprovskiy, V. S.; Klyshko, D. N.; Penin, A. N.

ORG: Physics Department of the Moscow State University im. M. V. Lomonosov (Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta) 13

TITLE: Photoconductivity of dielectrics under the influence of laser radiation

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 10, 1966, 385-389

TOPIC TAGS: photoconductivity, laser emission, ruby laser, sodium chloride, aluminum oxide, photon

ABSTRACT: The authors present preliminary results of experiments aimed at observing the photoconductivity induced in uncolored NaCl and Al_2O_3 single crystals by radiation from a ruby laser. The investigated sample was placed in a parallel-plate capacitor charged to a voltage $E_0 \sim 1$ kv. The laser flash induced in the capacitor a charge which was observed on an oscilloscope. To increase the radiation density (by a factor of ~5) and to reduce the beam dimensions, a cylindrical telescopic system was used. To avoid effects connected with the space charges, the voltage was applied to the capacitor only just before the flash; the capacitor was short-circuited during the intervals between the flashes. The logarithmic plots of maximum charge (Q) vs. radiation density (S) turned out to be essentially straight lines (corresponding to $Q \sim S^n$) with slopes $n = 4.9 \pm 0.4$ for NaCl and $n = 3 \pm 0.3$ for Al_2O_3. The

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ACC NR: AP6015799

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charge growth time was ~0.2 msec in both cases, this being apparently due to the presence of shallow traps. The authors attribute the observed effect to many-photon excitation of the electrons in the conduction band. The experimental values of S can be reconciled with theoretical estimates of the probability of n-photon absorption if the radiation energy averaged over the beam cross section is $\bar{S} \approx 100$ Mw/cm^2 for NaCl and $\bar{S} \approx 20$ Mw/cm^2 for Al_2O_3. It is pointed out in the conclusion that the observation of many-photon absorption in laser media is of interest for the study of the mechanism whereby they become damaged at large generation levels, and for the determination of the limiting laser power. The experiments also yield an estimate of the limiting radiation density S_{max} at which the gain in ruby is offset by three-photon absorption. This is found to be $S_{max} = 3 \times 10^9$ w/cm^2, which is two orders of magnitude smaller than the value of S_{max} calculated by F. V. Bunkin and A. M. Prokhorov (ZhETF v. 48, 1084, 1965). The authors thank S. A. Akhmanov and R. V. Khokhlov for valuable advice and discussion. Orig. art. has: 1 figure and 2 formulas.

SUB CODE: 20/ SUBM DATE: 01Mar66/ ORIG REF: 002/ OTH REF: 005

Card 2/2

NIKITIN, A.I.; VASYUTINSKIY, N.N.; DNEPROVSKIY, V.Ya.

Devices for noncontact measurements of wall thickness of very thin-walled pipes. Avtom. i prib. no.2:34-36 Ap-Je '65. (MIRA 18:7)

DNEPROVSKIY, Ye.V.

PHASE I BOOK EXPLOITATION SOV/4999

Vladimirov, Yevgeniy Vladimirovich, and Yevgeniy Vasil'yevich Dneprovskiy

Aktivnyy i avtomaticheskiy kontrol' detaley na stankakh-avtomatakh i avtomaticheskikh liniyakh (The Feedback and Automatic Control of Parts on Automatic Machine Tools and Automatic Lines) Minsk, Gos. izd-vo BSSR, 1960. 138 p. 2,000 copies printed.

Ed.: S. Pol'skiy; Tech. Ed.: N. Stepanova.

PURPOSE: This book is intended for personnel dealing with the automation of production, and especially for those concerned with problems of automatic control.

COVERAGE: The book, based on Soviet and non-Soviet sources, presents an analysis of methods and devices used in the feedback and automatic control of parts in the machine industry. Particular attention is given to types and systems of feedback control, the construction of transducers, and the use of transducers in various types of automatic machine tools and production lines. Chapters I, II; IV, V, and VI were written by Ye.V. Dneprovskiy, Engineer; Ye. V. Vladimirov, Engineer, wrote chapters III, VII, and VIII. The book was written under the supervision and with the participation of G.K. Goranskiy, Candidate of Technical Sciences.

~~Card 1/4~~

DNEPROVSKIY, Ye.V.

Active control of lathes. Sbor.trud.Inst.mash.i avtom.AN BSSR no.1: 47-55 '61. (MIRA 16:5)

(Lathes—Numerical control)

APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000410530011-6"

DNEPROVSKIY, Ye.V.

Automatic readjustment of metal-cutting tools. Mashinostroitel' no.10:23-24 O '61. (MIRA 14:9)
(Metal cutting tools) (Electronic control)

DNEPROVSKIY, Yu.N.

Comparative ecological studies of the photosynthesis and respiration of plants in the Kuray Range. Trudy TSSBS no.7:105-126 '64. (MIRA 17:11)

3293
S/208/62/002/001/007/016
D299/D303

24.6716

AUTHORS: Dnestrovskiy, Yu.N., and Kostomarov, D.P. (Moscow)

TITLE: Propagation of electromagnetic waves in a plasma normal to the external magnetic field

PERIODICAL: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 2, no. 1, 1962, 97 - 106

TEXT: The propagation of electromagnetic waves in a direction normal to the external magnetic field is considered. The existence and uniqueness of the solution is proved by the method of successive approximations. Thereupon, integral transforms are used for constructing solutions to the problem with initial conditions and the problem on wave excitation by side currents. These solutions show that notwithstanding the presence of complex roots in the corresponding dispersion equation, no energy transfer takes place from the plasma to the electromagnetic field (or conversely) during wave-propagation under steady-state conditions. In the linear approximation, plane-wave propagation in a plasma is described by equations:

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$$\frac{\partial f}{\partial t} + v_x \frac{\partial f}{\partial x} + \frac{e}{mc}[\mathbf{v}, \mathbf{H}_0] \frac{\partial f}{\partial \mathbf{v}} = -\frac{eN_0}{m} \mathbf{E} \frac{\partial f_0}{\partial \mathbf{v}}, \qquad (1)$$

$$\mathrm{rot}\,\mathbf{H} = \frac{1}{c}\frac{\partial \mathbf{E}}{\partial t} + \frac{4\pi}{c}\mathbf{j} + \frac{4\pi}{c}\mathbf{j}^{(\text{ст})}, \qquad (2)$$

$$\mathrm{rot}\,\mathbf{E} = -\frac{1}{c}\frac{\partial \mathbf{H}}{\partial t}, \qquad (3)$$

$$\mathbf{j} = e\int f\mathbf{v}\, d^3v. \qquad (4)$$

H_0 is a homogeneous magnetic field, normal to the direction of propagation. After computations, the problem reduces to two independent systems of integro-differential equations in the field components. For these two systems, existence- and uniqueness theorems are proved. The proofs are based on the method of successive approximations. This method (besides proving the existence and uniqueness of the solution) permits finding a majorant estimate for the solution and to investigate its behavior at the initial stage of the process. But this method is unsuitable for studying the behavior of the solution at $t \rightarrow \infty$ which is of great interest in practice. This can be achieved by the method of integral transforms which

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yields explicit expressions for the solutions. Thereby, it is assumed that the side currents are harmonic functions of time. The first system of integro-differential equations is considered; a Fourier transform (with respect to x) is carried out, and a Laplace transform (for t); the obtained algebraic system of equations is solved, yielding the result:

$$\mathcal{E}_x(\Omega, k) = I_v \frac{2\Omega\varepsilon_{12}(\Omega, k)}{(\Omega-\omega) D_1(\Omega, k)}, \quad \mathcal{E}_y(\Omega, k) = -I_v \frac{2\Omega\varepsilon_{21}(\Omega, k)}{(\Omega-\omega) D_1(\Omega, k)}. \tag{21}$$

Here $\mathcal{E}_{x,y}$ is the Fourier-Laplace image of the electric-field components:

$$\mathcal{E}_{x,y}(\Omega, k) = \int_0^\infty e^{i\Omega t} dt \frac{1}{2\pi} \int_{-\infty}^{\infty} e^{-ikx} E_{x,y}(t, x)\, dx \tag{22}$$

$$D_1(\Omega, k) = k^2c^2\varepsilon_{11} - \Omega^2(\varepsilon_{11}\varepsilon_{22} - \varepsilon_{21}\varepsilon_{12}). \tag{23}$$

The singularities of the functions $\mathcal{E}_x$ and $\mathcal{E}_y$ in the complex plane Ω are the zeros of the functions D_1 and the point $\Omega = \omega$. The equation $D_1(\Omega, k) = 0$ is the dispersion equation for the type of waves under consideration (extraordinary wave). By means of Mellin's transform, one obtains the originals from the images (21), viz.:

$$\left\{\begin{matrix} E_x(t,x) \\ E_y(t,x) \end{matrix}\right\} = I_\nu \int_{-\infty}^{\infty} \left[\left\{\begin{matrix} -\varepsilon_{12}(\omega,k) \\ \varepsilon_{11}(\omega,k) \end{matrix}\right\} \frac{2i\omega e^{i(kx-\omega t)}}{D_1(\omega,k)} + \sum_n \left\{\begin{matrix} -\varepsilon_{12}(\omega_n,k) \\ \varepsilon_{11}(\omega_n,k) \end{matrix}\right\} \frac{2i\omega_n e^{i(kx-\omega_n t)}}{(\omega_n-\omega)\frac{\partial D_1}{\partial \Omega}(\omega_n,k)} \right] dk. \quad (25)$$

Owing to dissipative processes, the free oscillations are damped and the solution for $t \to \infty$ is determined by the side currents only. These forced oscillations are separated by means of the principle of limit absorption. The first terms in Eq. (25) describe purely forced oscillations which determine the electromagnetic field for $t \to \infty$, (steady-state conditions). Thus

$$\left\{\begin{matrix} E_x^{st}(t,x) \\ E_y^{st}(t,x) \end{matrix}\right\} = \lim_{\nu \to 0} I_\nu \int_{-\infty}^{\infty} dk \frac{2i(\omega+i\nu)e^{-i(\omega t-kx)}}{D_1(\omega+i\nu,k)} \left\{\begin{matrix} -\varepsilon_{12}(\omega+i\nu,k) \\ \varepsilon_{11}(\omega+i\nu,k) \end{matrix}\right\}. \quad (26)$$

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By considering the disposition of the roots of Eq. (26), it is found that integral (26) can be computed along the real axis. As a result, the field in the region $x \geqslant 0$, is determined as the sum of the residues at the zeros of the function $D_1(\omega, k)$, viz.:

$$E_{x,y}^{st}(t, x) = I_y \left\{ \sum_n \alpha_{x,y}^{(n)} e^{i(k_n x - \omega t)} + \sum_n \beta_{x,y}^{(n)} e^{-i(k_n x + \omega t)} + \right. \left. + \sum_n \gamma_{x,y}^{(n)} e^{-\varkappa_n x - i\omega t} + \sum_n (\delta_{x,y}^{(n)} e^{ip_n x} + \delta_{x,y}^{(n)*} e^{-ip_n x}) e^{-q_n x - i\omega t} \right\}, \quad (27)$$

where α, β, γ and δ are constants. The first sum in (27) represents undamped waves with phase velocity directed from the source away, the second sum -- undamped waves with phase velocity towards the source, the 3rd and 4th sums represent exponentially damped solutions and standing waves, respectively. It is noted that (notwithstanding the complex roots), no energy transfer between plasma and electromagnetic field takes place. Further, the dispersion equation $D_2(\Omega, k) = 0$ is derived (for the ordinary wave). The above solutions were constructed on the assumption of zero initial conditions. In case of nonzero initial conditions, the solution can be obtained entirely analogously. In conclusion it is noted that the
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solution (25) was obtained formally, without ascertaining its conditions of applicability. There are 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: E.P. Gross, Plasma oscillations in a static magnetic field. Phys. Rev., 1951, 82, no. 2, 232-242.

SUBMITTED: July 18, 1961

Card 6/6

DNESTROV, G. A.

Stock and Stockbreeding

Diversified economy on a progressive collective farm. Sots. zhiv. 14 No. 7, 1952.

9. Monthly List of Russian Accessions, Library of Congress, December 1953, Uncl.
2

Met. Abs.

II. Properties of Alloys.

***Brittleness of Cupro-Nickel Condenser Tubes and the Development of a Technology for Their Production.** A. P. Smiryagin, N. Z. Dreitsovskiy, V. A. Koshkin, and N. I. Zedin (*Tsvet. Metally* (*Non-Ferrous Metals*), 1940, 15, 96–105; (2), 72–79).—[In Russian.] In connection with excessive annealing brittleness of 70 : 30 cupro-nickel condenser tubes, a study of the whole process of production was carried out. Investigations at the works on tubes scrapped owing to annealing brittleness and on tubes which could be drawn satisfactorily, indicated that carbon in excess of about 0·05% was the cause of brittleness. The carbon was introduced with the "Mond" nickel granules and, to a lesser extent, with works scrap contaminated with graphite-containing drawing lubricant. Incorrect annealing involving overheating was a contributory cause. The above observations were confirmed by small-scale experimental melts. To avoid carbon, cathode nickel should be used instead of "Mond" nickel. The covering of the melt with carbon introduces only a negligible amount of carbon. Melts must be covered with carbon to prevent oxidation, which has a very harmful effect on the metal. Half-hard drawn tubes should be given a stress-relieving anneal at 450–550° C. This will eliminate any tendency to crack in the mercuric nitrate solution test. For complete annealing, use temperatures above the recrystallization temperature of 570° C. but not above 700° C., *i.e.* between 580° and 650° C. For annealing at the works, holding for 2 hrs. at the annealing temperature is recommended. The temperature to which extrusion billets are heated has no marked effect on the properties of the tubes and can be chosen to suit the capacity of the press. A sequence of drawing passes (reductions per pass of 29–20%) was developed for the cupro-nickel tubes containing less than 0·05% carbon. The first surfacing was done before drawing. The previously used graphite-containing lubricant was abandoned in favour of thick grease, linseed oil, or emulsion.—A. B.

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

Ca

Copper alloy. N. Z. Dnestrovskii. U.S.S.R. 66,055, March 31, 1946. A Cu alloy contg. Zn 0.8-1.2 and P 0.03-0.05% is used for making radiator tubes.

M. Hosch

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COMMON ELEMENTS

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AUTHOR INDEX

1ST AND 3RD LETTER

DNESTROVSKIY, NIKOLAY ZEL'MANOVICH

DNESTROVSKIY, Nikolay Zel'manovich; BOGOLYUBSKIY, V.I., inzhener, retsenzent; LEKARENKO, Ye.M., inzhener, retsenzent; SHPICHENETSKIY, Ye.S., redaktor; STARODUBTSEVA, S.N., redaktor; BEKKER, O.G., tekhnicheskiy redaktor.

[Drawing of nonferrous metals and alloys] Volochenie tsvetnykh metalov i splavov. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1954. 270 p. (MLRA 8:3)

(Metal drawing)(Nonferrous metals--Metallurgy)

DNESTROVSKIY, N.Z.; YUKHVETS, I.A., redaktor; LARIONOV, G.Ye., tekhnicheskiy redaktor

[Drawing tool] Volochil'nyi instrument. Moskva, Gos. energ. izd-vo, 1954. 188 p. (MLRA 7:10)
(Metalworking machinery)
(Metal drawing)

DNESTROVSKIY, Nikolay Zinov'yevich; POMERANTSEV, Sergey Nikolayevich; SHPICHINETSKIY, Ye.S., kand. tekhn. nauk, retsenzent; POSTNIKOV, N.N., inzh., retsenzent; RZHEZNIKOV, V.S., red.; KOSOLAPOVA, E.F., red. izd-va; BERLOV, A.P., tekhn. red.

[Concise manual on working nonferrous metals and alloys] Kratkii spravochnik po obrabotke tsvetnykh metallov i splavov. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi metallurgii, 1958. 406 p. (MIRA 11:8)

(Nonferrous metals—Metallurgy)

DNESTROVSKIY, Nikolay Zel'manovich; POMERANTSEV, Sergey Nikolayevich [deceased]; ZVEREV, V.V. [deceased]; SHPICHINETSKIY, Ye.S., kand. tekhn. nauk, retsenzent; POSTNIKOV, N.N., inzh., retsenzent; RZHEZNIKOV, V.S., red.; KOSOLAPOVA, E.F., red. izd-va; BERLOV, A.P., tekhn. red.

[Brief manual on the treatment of nonferrous metals and alloys] Kratkii spravochnik po obrabotke tsvetnykh metallov i splavov. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1961. 410 p. (MIRA 14:8)

(Nonferrous metals) (Metalwork)

PHASE I BOOK EXPLOITATION SOV/5530

Smiryagin, A. P., N. Z. Dnestrovskiy, A. D. Landikhov, N. N. Kreyndlin, G. N. Krucher, V. A. Golovin, B. L. Urin, and V. N. Gol'dreyer

Spravochnik po obrabotke tsvetnykh metallov i splavov (Handbook on the Processing of Nonferrous Metals and Alloys) Moscow, Metallurgizdat, 1961. 872 p. Errata slip inserted. 9,300 copies printed.

Ed. (Title page): L. Ye. Miller, Candidate of Technical Sciences; Ed. of Publishing House: K. D. Misharina; Tech. Ed.: M. K. Attopovich.

PURPOSE: This handbook is intended for technical personnel of metal-working and machine-building plants, design organizations, scientific research institutes, and laboratories, and for students at schools of higher technical education.

COVERAGE: The handbook discusses the physicochemical and mechanical properties of certain elements and the composition and properties of

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nonferrous metals and alloys, and includes an explanation of the theory of principal methods for the hot and cold working of nonferrous metals and alloys. Reference material on designing, engineering-economic planning, quality control, and other aspects of production is systematized and presented. Each part of the handbook contains explanations of principles underlying basic processes, presents formulas for process and engineering calculations, analyzes properties of metals and alloys, gives parameters of accompanying and secondary processes, and describes equipment and tools and their operational parameters. The authors thank I. L. Perlin, Ya. F. Shabashov, and M. F. Bazhenov. References accompany each part, as well as various chapters. There are 130 references, mostly Soviet.

APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000410530011-6"

PART VI. WIRE MANUFACTURE
[by N. Z. Dnestrovskiy, Engineer]

APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000410530011-6"

CHININA, N.S.: NIKOL'SKAYA, M.N.; DNESTROVSKIY, N.Z.; PETROVA, O.A.

Electrolytic polishing of rectangular wires. Biul.tekh.-ekon.inform.-Gos.nauch.-issl.inst.nauch. i tekh.inform. no.4:15-17 '62.

(MIRA 15:7)

(Electrolytic polishing)

PHASE I BOOK EXPLOITATION 911

Dnestrovskiy, Nikolay Zinov'yevich and Pomerantsev, Sergey Nikolayevich

Kratkiy spravochnik po obrabotke tsvetnykh metallov i splavov (Handbook on Working of Nonferrous Metals and Alloys) Moscow, Metallurgizdat, 1958. 406 p. 11,500 copies printed.

Reviewers: Shpichinetskiy, Ye.S., Candidate of Technical Sciences, and Postnikov, N.N., Engineer; Ed.: Rzheznikov, V.S.; Ed. of Publishing House: Kosolapova, E.F.; Tech. Ed.: Berlov, A.P.

PURPOSE: This book is intended for engineers, designers and other personnel who need basic information on the most widely used nonferrous metals and alloys.

COVERAGE: This is a handbook containing information on the basic properties of the most widely used nonferrous metals and alloys and methods of cold forming and hot forming them. Various

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formulas for calculation of basic data in rolling, drawing and pressing of nonferrous metals and alloys are given. The author thanks A.P. Smirnov for help in preparing the book. Chapters I, II, and III were written by S.N. Pomerantsev, Chapter V by N.Z. Dnestrovskiy and V.V. Zverev, and Chapters IV, VI, and VII by N.Z. Dnestrovskiy. There are 26 Soviet references (including 4 translations).

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12-15-58

DNESTROVSKIY, YU. N.

FD-1505

USSR/Mathematics - Proper values

Card 1/1 : Pub. 129-8/18

Author : Dnestrovskiy, Yu. N.

Title : Variation of the eigenvalues when the region of the boundary varies

Periodical : Vest. Most. Un., Ser. fizikomat. i. yest. nauk, 9, No 6, 61-74, Sep 54

Abstract : Continuation of previous works by author (DAN, 63, 6: "Variation of the eigen values in the case of fixing within the region, "Dissertation of Moscow Univ., 1948) studying variation of eigen functions in the case of additional fixing within a small region near the limit or near the nodes. The variation of the eigen function will be expressed in smaller terms, while the concept of capacity loses its meaning. Indebted to Prof. A. A. Samarskiy, Eight references including 2 foreign.

Institution : Moscow University, Chair of Mathematics of Physics Faculty

Submitted : May 23, 1953

DNESTRCVSKIY, Yu. N.

DNESTROVSKIY, Yu. N.: "On the change in natural values in changing field". Moscow, 1955. Moscow State U imeni M. V. Lomonosov, Physics Faculty. (Dissertation for the Degree of Candidate of Physicomathermathical Science)

SO: Knizhnaya Letopis', No. 40, 1 Oct 55

DNESTROVSKIY, YU N.

SUBJECT USSR / PHYSICS CARD 1 / 4 PA - 1975
AUTHOR DNESTROVSKIJ,JU.N.
TITLE The Modification of the Eigenfrequencies of Electromagnetic Resonators.
PERIODICAL Dokl.Akad.Nauk 111, fasc.1, 94-97 (1956)
Issued: 1 / 1957

The problem of the modification of these eigenfrequencies in the case of a slight modification of the shape of the resonator or the introduction of small, perfectly conductive bodies into the interior of the resonator, was investigated by many authors by the perturbation method. Because of the complicated nature of the problem all authors were content with the first approximation, and the problem of higher approximations was not raised. However, for the problem of the introduction of small conductive bodies into the interior of the resonator the result obtained by means of the first perturbational approximation is too rough. On the occasion of attempts made to improve the results of the perturbation theory for bodies of special shape (sphere, rotation ellipsoid) the problem regarding the degree of accuracy of the formulae obtained remained open. The present work investigates the modification of the eigenfrequencies of the resonators by the method of successive approximations, on which occasion convergence is proved first. For the modification of the eigenvalue $\Delta\lambda$ a general formula is obtained from which results the formula by MAIER and SLATER for a spherical conductive body.
The general method is also suited for the problem of the modification of eigenvalues as a result of a modification of the parameters ε and μ within the re-

sonator. The results obtained in this manner are then compared with the first approximation of the perturbation theory. It is further shown that, on the occasion of the introduction of a small dielectric body into the interior of the resonator, the perturbation theory offers a result for the modification of the eigenvalue that differs considerably from the true result.
In a closed volume T with perfectly conductive boundary Γ the problem of the free oscillations of an electromagnetic field $\vec{E}$, $\vec{H}$ is here investigated for the case of lacking spatial flows and charges ($\varepsilon = \mu = const = 1$):
curl curl $\vec{E} = k^2 \vec{E}$ in T, $[\vec{E}, \vec{n}] = 0$ to Γ, $\vec{H} = (1/k)$ curl $\vec{E}$. Here the homogeneous integral equation $\vec{E}(M) = k^2 \int_T K_t(M, M') \vec{E}(M') d\tau_{M'}$ is investigated.
Here $K_t(M,M')$ denotes GREEN'S tensor for the volume T which satisfies the following conditions: $K_t = \Gamma_t + g_t$, $\Gamma = I/4\pi r_{MM'}$, div $\Gamma_t = 0$. Γ_t denotes the "transversal" part of the fundamental tensor Γ and I - the unit tensor.
Furthermore it is true that curl curl $K_t = 0$, div $K_t = 0$ in T at $M \neq M'$, $[K_t, \vec{n}] = 0$ on Γ. The latter equation determines the nucleus $K_t(M,M')$ univocally.
Theorem: In order that $\vec{E}$ be an eigenfunction of the problem set here it is necessary and sufficient that $\vec{E}$ be an eigenfunction of the above mentioned integral equation.

It follows from this theorem as well as from the aforementioned conditions that the nucleus K_t is symmetric, integrable in the square, steady in the average, and positively definite. Herefrom follows the convergence of the method of successive approximations for the equation mentioned above. For the domains of T for which the tensor K_t exists there exists a discrete spectrum of eigenvalues and eigenfunctions of the problem investigated here. The terms of the functional sequence of the method of the successive approximations of the equation mentioned at the beginning satisfies the following relations: $E_n = \int_T K_t E_{n-2} d\tau$. Therefore, on the basis of the theorem mentioned, these terms are also solutions of the following boundary value problems: curl curl $\vec{E}_n = \vec{E}_{n-2}$, div $\vec{E}_n = 0$ in T, $[\vec{E}_n, \vec{n}] = 0$ to Γ. From the functions $\vec{E}_n$ numerical consequences can then be built up for which the recurrence formula is valid.

It is then presupposed that the volume T is slightly modified either as the result of a deformation of the external boundary or of the introduction of small perfectly conductive bodies: $T = \tau + g$, where g denotes a small domain with the boundary $\gamma + g$.

Next, the problem curl curl $\vec{E} = \lambda \vec{E}$ in τ, $[\vec{E}, \vec{n}] = 0$ to $\Gamma + \gamma$ is investigated in the domain τ, and:

$\lambda^{(k)}$ and $E^{(k)}$, $H^{(k)}$ denote the eigenvalues and eigenfunctions respectively of this problem. The aforementioned problem is investigated by the method of successive approximations. The functions $\vec{E}_n$ are searched for in form of a sum of the solution of the problem I and a correction function $\vec{f}_n$: In this way $\vec{E}_n = \vec{e}_1/k_1^n + \vec{f}_n$ is found, where $\vec{f}_n$ satisfies certain boundary conditions mentioned in this connection. Next, the eigenvalue $\lambda^{(1)}$ is determined and the definite formula is written down. This formula differs from the result of the perturbation theory. The formulae obtained are specialized also for the case that a small perfectly conductive spherical body was introduced into the interior of the resonator. The results obtained by MAIER and SLATER for a small sphere agree with the results obtained here, and therefore the author describes them as correct.

The method of successive approximations is also suited for the problem of the modification of eigenvalues on the occasion of a modification of the parameters ε and μ in the interior of the domain T. Such a modification is especially mentioned because of the introduction of a small dielectric body into a homogeneous endovibrator, and it is specialized for a small sphere.

INSTITUTION: Moscow State University

DNESTROVSKIY, Yu. N. 20-3-8/46

AUTHORS: Dnestrovskiy, Yu. N., Kostomarov, D.P.

TITLE: The Radiation of Charged Particles Flying Past Ideally Conductive Bodies (Izlucheniye zaryazhennykh chastits pri prolete vozle ideal'no provodyashchikh tel).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 3, pp. 377-380 (USSR)

ABSTRACT: The present report investigates the general problem referred too in the title, in non-relativistic approximation. The authors investigate the radiation of a punctiformly charged particle with the mass m and the charge e in flying past the ideally conductive surface S. The surface S is assumed to be axially symmetric and to have the equations $r = h_1(s)$, $z = h_2(s)$; here s is the length of the arc $(-\infty < s < +\infty)$ and it is assumed that $r(s) \neq 0$, $\lim_{s \to \pm\infty} r(s) \neq 0$.

The charge is assumed to move on the axis of the system from negative to positive values of z. This problem is very complicated, if carefully treated. The present information is limited to the investigation of non-relativistic approximation, the problem can subsequently be divided into

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The Radiation of Charged Particles Flying Past Ideally Conductive Bodies.

two problems:

I) The equation of motion of the charge should be integrated without taking account of the retardation and the values of charges and currents induced in the screen should be determined.

II) The radiation of the system of the currents which were determined by solving problem I, should be computed. First the equations for problem I are given. The solution of these equations by means of nondimensional coordinates is followed here step by step. The terms obtained in this way for the output w and for the total radiation E are indicated. Subsequently two subcases are discussed which correspond to various limiting cases. The analysis carried out permits the following conclusions:

1) The total radiation grows with an increase of the initial velocity like v_o^3

2) The spectrum essentially consists of waves which are much longer than a certain characteristic dimension of the system. But with an increase of v_o the limit of the radiated spectrum moves in direction to shorter waves.

3) The lower limit of the applicability of approximation of the assumed currents is determined by an inequation, which is given here. Finally the authors investigate the case in which the system is not excited (activated) by individual punctiform charges, but by a modulated electron ray moving at constant velocity v_0. In this case the radiation of the system is monochromatic and the frequence of this radiation is equal to the frequence w of the excitation. Finally the authors computed the radiation at the flight of a bundle of particles from an open half space into a round wave guide. In this case the radiation resistance depends largely on the initial velocity, and frequence, as well as on the radius of the channel. There are 2 figures, and 5 references, 5 of which are Slavic.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova).

20-3-8/46

The Radiation of Charged Particles Flying Past Ideally Conductive Bodies.

PRESENTED: May 18, 1957, by M. A. Leontovich, Academician.

SUBMITTED: May 17, 1957.

AVAILABLE: Library of Congress

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109-3-5-10/17

AUTHOR: Dnestrovskiy, Yu.N.

TITLE: Perturbation of the Natural Frequencies of Electro-magnetic Resonators by Ferrites (Vozmushcheniye sobstvennykh chastot elektromagnitnykh rezonatorov ferritami)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol III, Nr 5, pp 675 - 689 (USSR).

ABSTRACT: It is assumed that the investigated resonator contains a volume of ferrite whose properties can be described by the permeability tensor:

$$\overline{\overline{\mu}} = \begin{pmatrix} \mu & -i\eta & 0 \\ i\eta & \mu & 0 \\ 0 & 0 & \mu_z \end{pmatrix} \qquad (1)$$

and by permittivity ε. The components of the tensor described by Eq.(1) are functions of $k = \omega/c$ and of the magnetising field $\overline{H}_=$. The problem of finding the magnitude of the perturbation caused by the presence of the ferrite is solved by the method of successive approximations and the resulting formulae are represented by Eqs.(19) and (21). The formulae are used to determine the perturbation in a resonator containing

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Perturbation of the Natural Frequencies of Electro-magnetic Resonators by Ferrites

a ferrite sphere having a radius R such that $R \ll \Lambda$, where Λ is the length of the standing wave in the resonator. It is shown that in the first approximation, the perturbation is expressed by:

$$\frac{\Delta\lambda}{\lambda_1} = - \gamma_1^0 V_g + O(R^5) \qquad (29)$$

where V_g is the volume of the ferrite. If the resonator contains a thin ferrite plate, whose thickness $2l \ll \Lambda$, the perturbation can approximately be expressed by:

$$\frac{\Delta\lambda_1}{\lambda_1} = - \gamma_1^0 l + O(l^2) \qquad (34).$$

For a resonator containing a ferrite cylinder of a radius R, such that $R \ll \Lambda$, the perturbation is given by:

$$\frac{\Delta\lambda_1}{\lambda_1} = -\pi R^2 \gamma_1^0 + O(R^4 \ln R) + O(R^4) \qquad (40).$$

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109-3-5-10/17

Perturbation of the Natural Frequencies of Electro-magnetic Resonators by Ferrites

If the resonator contains a spheroid of revolution whose semi-axes are a, b and c, and if the ferrite is magnetised along the axis of the revolution, the perturbation can accurately be expressed by Eq.(50); for a resonator containing an elongated spheroid, the perturbation is expressed by Eq.(52). The method of successive approximation is extended to the evaluation of the perturbation in the case of degenerate, natural (eigen) frequencies (or wavelengths). The resulting formulae are given by Eqs.(57) and (60). These are used to estimate the perturbation in a resonator containing a small ferrite sphere of radius R, the resonator being a "solid" of revolution; the axis of the revolution is coincident with the z axis of the co-ordinate system and the ferrite is magnetised in the direction of the z axis. It is shown that, for this case, the two limits of the perturbation can be expressed by Eqs.(64). The author expresses his gratitude to A.A. Samarskiy for discussing the results of this work. There are 10 references, 7 of which are English and 3 Soviet.

Card3/3

SUBMITTED: June 4, 1957

1. Resonators-Ferrite properties-Theory

SOV-46-4-3-5/18

AUTHOR: Dnestrovskiy, Yu. N.

TITLE: Variation of the Natural Frequencies of Membranes and Resonators with Added Masses (Izmeneniye sobstvennykh chastot membran i rezonatorov pri dopolnitel'nykh nagruzkakh)

PERIODICAL: Akusticheskiy Zhurnal, 1958, Vol 4, Nr 3, pp 244-252 (USSR)

ABSTRACT: The problem of the effect of loads on the vibration of membranes and resonators was considered by Rayleigh (Ref.1). He treated the variation of the natural frequency as a function of the density of the system. The problem was also considered by Courant and Hilbert (Ref.2). Recently the problem was taken up again (Refs.2, 3, 4 and 5). The present paper is concerned with the problem as to how does the natural frequency of a membrane or a volume resonator T change with the boundary G if it is loaded with an additional mass m distributed over a region g having a boundary h (Fig.1). It turns out that the quantity which characterises the dimensions of the region g is not its area, or its maximum diameter, but the so-called 'capacity' C (g, G) of the region g relative to the boundary G .

SOV-46-4-3-5/18

Variation of the Natural Frequencies of Membranes and Resonators with Added Masses

This capacity is identical with the electrical capacity of a conductor of the same form. It is shown, as an example, that for a small circle of radius r the capacity is given by $C(g, G) \sim 1/\log(1/r)$ and for a small sphere of radius R in space $C(g, G) \sim R$. Regions of zero capacity on a plane are separate points, and in space lines and points. It is shown that one cannot load a membrane over the zero capacity region. Even a small load distributed over a zero capacity region disturbs the system very considerably. If the load m is fixed and the region g shrinks, so that its capacity tends to zero, all the natural frequencies of the membrane shift to the left by one number. Conversely, if the region g is fixed and the load m increases without limit, all the spectrum of natural frequencies also shifts to the left by one number with small corrections which depend upon $C(g, G)$. The special case of the latter problem (circular membrane) was considered in

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(Ref.6). The majority of the results in the present paper could have been obtained by the usual variational method but the use of successive approximations lends itself to the derivations of the results more naturally. The latter method was therefore used. The behaviour of the degenerate natural frequencies is also considered. A. A. Samarskiy is thanked for his advice. There are 5 figures and 12 references, of which 7 are Soviet.

ASSOCIATION: Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta (Department of Physics of Moscow State University)

SUBMITTED: July 8, 1957.

1. Resonators--Frequency shift 2. Membranes--Frequency shift

DNESTROVSKIY, YU. N.

16(1) PHASE I BOOK EXPLOITATION SOV/2660

Vsesoyuznyy matematicheskiy s"yezd. 3rd, Moscow, 1956

Trudy. t. 4: Kratkoye soderzhaniye sektsionnykh dokladov. Doklady inostrannykh uchenykh (Transactions of the 3rd All-Union Mathematical Conference in Moscow. vol. 4: Summary of Sectional Reports. Reports of Foreign Scientists) Moscow, Izd-vo AN SSSR, 1959. 247 p. 2,200 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Matematicheskiy institut.

Tech. Ed.: G.N. Shevchenko; Editorial Board: A.A. Abramov, V.G. Boltyanskiy, A.M. Vasil'yev, B.V. Medvedev, A.D. Myshkis, S.M. Nikol'skiy (Resp. Ed.), A.G. Postnikov, Yu. V. Prokhorov, K.A. Rybnikov, P. L. Ul'yanov, V.A. Uspenskiy, N.G. Chetayev, G. Ye. Shilov, and A.I. Shirshov.

PURPOSE: This book is intended for mathematicians and physicists.

COVERAGE: The book is Volume IV of the Transactions of the Third All-Union Mathematical Conference, held in June and July 1956. The book is divided into two main parts. The first part contains summaries of the papers presented by Soviet scientists at the Conference that were not included in the first two volumes. The second part contains the text of reports submitted to the editor by non-Soviet scientists. In those cases when the non-Soviet scientist did not submit a copy of his paper to the editor, the title of the paper is cited and, if the paper was printed in a previous volume, reference is made to the appropriate volume. The papers, both Soviet and non-Soviet, cover various topics in number theory, algebra, differential and integral equations, function theory, functional analysis, probability theory, topology, mathematical problems of mechanics and physics, computational mathematics, mathematical logic and the foundations of mathematics, and the history of mathematics.

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SOV/109-59-4-2-19/27

AUTHORS: Dnestrovskiy, Yu.N. and Kostomarov, D.P.

TITLE: Radiation of Charged Particles During Their Transit Near Ideally Conducting Bodies (Izlucheniye pri prolete zaryazhennykh chastits vozle ideal'no provodyashchikh tel)

PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 2, pp 303-312 (USSR)

ABSTRACT: A point-type charged particle, having a mass m and a charge e, passes in the vicinity of an ideally conducting surface S. It is assumed that the surface S has an axial symmetry and that it can be represented by the first equations on p 304; the particle moves along the axis z (see Fig 1). Mathematically, the problem is expressed by

$$\Delta u = 0 \text{ in the region } T; \quad u\big|_S = -u_0\big|_S \tag{1}$$

$$m\ddot{z}_0 = -e \frac{du}{dz}(0,z,z_0)\Big|_{z=z_0}; \quad \lim \dot{z}_0(t) = v_0 \tag{2}$$

where T is a region bounded by the surface S, u_0 is the

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SOV/109-59-4-2-19/27

Radiation of Charged Particles During Their Transit Near Ideally Conducting Bodies

Coulomb potential of the charge e when situated at a point M_0. Integration of Eq (2) leads to Eq (3) where f is expressed by Eq (3a), while g is given by the regular portion of the Green function G (see p 304). The charge densities σ and the currents j induced in the screen S are given by Eq (4) and (5) respectively. The radiated power is expressed by Eq (8), the radiation energy by Eq (9) and its power spectrum by Eq (10), where various parameters are defined by the equations on p 305. In the case of small initial electron velocities, Eq (9) can be written as Eq (12), while for high initial electron velocities, the total radiated energy can be expressed by Eq (13) or Eq (14). If the above radiation system is excited not by a single charged particle, but by a modulated electron beam having a constant velocity v_0, the radiated power can be expressed by Eq (20), where I_0 denotes the beam current and V_0 is the accelerating potential. The radiation resistance of the system and its power efficiency are given by Eq (21) and (22) respectively. The above

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SOV/109-59-4-2-19/27

Radiation of Charged Particles During Their Transit Near Ideally Conducting Bodies

analytical expressions can be used to investigate the radiation of the charges which enter a circular waveguide fitted with an infinitely large flange (see Fig 2). In this case the function Ψ is expressed by Eq (23). The energy radiated by a single particle entering a waveguide is given by Eq (24), while the radiation resistance of the system is expressed by Eq (25). The dependence of the radiation resistance on the parameters a/λ and β is shown in Fig 4 and 5; a denotes the radius of the waveguide. The derivation of some of the formulae of the article is given in the Appendix on pp 311-312. The authors express their gratitude to R.V.Khokhlov and V.B.Braginskiy for suggesting the problem and discussing the results. The paper was read at the Electronics

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SOV/109-59-4-2-19/27

Radiation of Charged Particles During Their Transit Near Ideally Conducting Bodies

Section of the "Radio Day Conference" in May 1957. There are 5 figures, 1 table and 6 Soviet references.

ASSOCIATION: Fizicheskiy Fakul'tet Moskovskogo Gosudarstvennogo Universiteta im. M.V.Lomonosova (Physics Department of the Moscow State University imeni M.V.Lomonosov)

SUBMITTED: 4th June 1957

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SOV/20-124-4-17/67

9(3)

AUTHORS: Dnestrovskiy, Yu. N., Kostomarov, D. P.

TITLE: The Radiation of a Modulated Beam of Charged Particles When Passing Through a Circular Opening in a Plane Screen (Izlucheniye modulirovannogo puchka zaryazhennykh chastits pri prolete cherez krugloye otverstiye v ploskom ekrane)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 4, pp 792-793 (USSR)

ABSTRACT: The present paper discusses the calculation of the radiation which occurs during the passing of the modulated electron beam through a circular opening in an infinitely thin and ideally conductive screen. The calculation was carried out for the velocity range of from $\beta = 0.1$ to $\beta = 0.99$ ($\beta = v/c$) by the numerical solution of the corresponding integral equation by means of the electronic computer "Strela". For this purpose a cylindrical system of coordinates is introduced. The total electromagnetic field is represented in the form $\vec{E}^{(t)} = \vec{E}^{(o)} + \vec{E}$, $\vec{H}^{(t)} = \vec{H}^{(o)} + \vec{H}$; here $\vec{E}^{(o)}$ and $\vec{H}^{(o)}$ denote the field induced by the beam in the infinite space, $\vec{E}$ and $\vec{H}$ denote the field caused by the existence of the screen. The

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The Radiation of a Modulated Beam of Charged Particles When Passing Through a Circular Opening in a Plane Screen

problem is reduced to determination of the additional field $\vec{E}$ and $\vec{H}$, which satisfies a homogeneous system of Maxwell equations and the corresponding mixed boundary conditions in the plane z = 0. From the vectorial analogue of Green's formulas for the aforementioned field a relation for $\vec{H}(M)$ is obtained, and herefrom one further obtains a Fredholm integral equation of the first kind. The unique solution of this integral equation is also the solution of the problem upon which the present paper is based. The second part of this paper gives the computation steps. The expression found for H_φ is written down. Here φ denotes one of the polar coordinates. The dependence of the radiation resistance on the distribution of the current density in the bundle is shown by 2 diagrams. Finally, two limiting cases are investigated, and asymptotic formulas for them are set up. There are 2 figures and 6 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

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24(4) SOV/20-124-5-18/62

AUTHORS: Dnestrovskiy, Yu. N., Kostomarov, D. P.

TITLE: The Radiation of Ultrarelativistic Charges During Passage Through a Circular Opening in a Screen (Izlucheniye ul'trarelyativistskikh zaryadov pri prolete cherez krugloye otverstiye v ekrane)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 5, pp 1026-1029 (USSR)

ABSTRACT: In one of the authors' earlier papers the radiation of a modulated beam of charged particles during passage through a circular opening in an ideally conductive screen was calculated. By using the asymptotic formulas derived for ultrarelativistic velocities, the authors calculate the radiation occurring during passage of an arbitrary axially-symmetrically distributed charge through a circular opening. The charge is assumed to move as a whole with constant ultrarelativistic velocity. A cylindrical system of coordinates is introduced, the z-axis of which passes through the center of the opening vertical to the plane of the screen. A certain charge with the constant ultrarelativistic velocity $v(\beta = v/c \sim 1)$ is

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assumed to move in the positive direction of the z-axis. In the system of coordinates moving simultaneously the charge with the density $\varrho = \varrho(r, z)$ is assumed to be distributed. For the electromagnetic field $\vec{E}^{(t)} = \vec{E}^{(0)} + \vec{E}$, $\vec{H}^{(t)} = \vec{H}^{(0)} + \vec{H}$ is assumed. Here $\vec{E}^{(0)}$ and $\vec{H}^{(0)}$ denote the total electric and magnetic field strength respectively; $\vec{E}^{(0)}$ and $\vec{H}^{(0)}$ - the field of the simultaneously moving charge in free space; $\vec{E}$ and $\vec{H}$ - the additional field generated by the existence of the screen. The field $\vec{E}^{(0)}$, $\vec{H}^{(0)}$ makes no contribution to the radiation, and the problem is reduced to calculation of the additional field. The current density j_z, and the electric and magnetic field strengths are expanded in Fourier integrals. For the Fourier component of the additional magnetic field in the wave zone a formula is derived. Next, the radiated energy is calculated. The maximum of the spectral density of the radiation is within the range of low frequencies.

The Radiation of Ultrarelativistic Charges During Passage Through a Circular Opening in a Screen

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With increasing velocity of the charge the share of short waves in the radiated energy increases. The total energy of radiation is proportional to the total energy of the charge $T = mc^2$, and the ratio depends only to a small extent on velocity. For a single electron this ratio is very low, but in the case of condensations it increases in proportion to the number of electrons in this condensation. The results obtained by the present paper are suited for the purpose of estimating the energy radiated by the particles in accelerators when flying past geometric inhomogeneities in the accelerating interspaces. The authors also mention a short numerical example. The effect discussed in the present paper is quite remarkable and should be taken into account when designing accelerators for ultrarelativistic particles. There are 1 figure and 1 Soviet reference.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: October 14, 1958, by B.A. Vvedenskiy, Academician

Card 3/4

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E140/E455

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AUTHORS: Dnestrovskiy, Yu.N. and Kostomarov, D.P.

TITLE: Electromagnetic Radiation Due to a Beam of Charged Particles Passing a Waveguide with Infinite Flange 25

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol.5, No.9, pp.1431-1441

TEXT: The article concerns radiation arising with passage of a modulated beam of charged particles past a plane waveguide with infinite flange. This problem arises, for example, in the study of radiation of higher electromagnetic field harmonics in magnetrons. The problem is considered in the two-dimensional case. The waveguide and flange are assumed ideally conducting; the beam is directed perpendicular to the plane of symmetry of the waveguide, and the effect of radiation and charged interaction on the motion of the beam is neglected, the charge velocity being taken constant (the assigned-current approximation). The electromagnetic field in the waveguide is written in the form of a superposition of normal waves with undefined coefficients. Using the vector analogy to Green's formula, an infinite system of algebraic equations in these coefficients is constructed. The system was

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Electromagnetic Radiation Due to a Beam of Charged Particles Passing a Waveguide with Infinite Flange

solved numerically on the electronic computer "Strela". The radiation in the waveguide (waveguide excitation) and the radiation into the open half-space are considered. Graphs are given for various cases. Acknowledgment is made to R.V.Khokhlov for his assistance. There are 6 figures, 1 table and 8 Soviet references.

ASSOCIATION: Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta im. M.V.Lomonosova (Physics Faculty, Moscow State University im. M.V.Lomonosov)

SUBMITTED: August 4, 1959

Card 2/2

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B006/B063

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AUTHORS: Dnestrovskiy, Yu. N., Kostomarov, D. P.

TITLE: Electromagnetic Waves in a Semispace Filled With Plasma

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 3(9), pp. 845-853

TEXT: The present paper describes a theoretical study of the penetration of electromagnetic waves into a plasma-filled semispace. In addition to Maxwell equations, a linearized equation of electron motion is used to describe this process. The requirement of mirror reflection of the electrons serves as a boundary condition at the boundary of the plasma. This problem has been studied repeatedly (Refs. 1-6). Methods and results of previous studies (L. D. Landau and V. P. Silin) are discussed by way of introduction, and the contribution made by V. D. Shafranov is dealt with in greater detail. The problem appears to be solved consistently only for the special case of the plasma being placed in a magnetic field $\vec{H}_0$, which is perpendicular to the plasma surface and parallel to the direction of propagation of the electromagnetic wave. The reverse case is

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Electromagnetic Waves in a Semispace Filled With Plasma

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treated in the present paper: The magnetic field is assumed to be parallel to the plasma boundary and perpendicular to the direction of the wave propagation; further, the electric vector is assumed to be polarized parallel to the magnetic field (ordinary wave). In other terms, the plasma in the semispace $x > 0$ is exposed to a steady magnetic field $\vec{H}(x) = \{0, 0, H(x)\}$; and in the plane $x = 0$, $E_x = E_y = 0$ and $E_z = E_z(0,y)e^{-i\omega t}$. It is assumed that the plasma be neutral on the average, that the electromagnetic wave has no effect on the ions, and is only slightly disturbed by the electron component of the plasma; the effect of the magnetic wave field on the plasma may be neglected when compared with that of the electric field and that of the steady magnetic field. The space $x < 0$ is assumed to be free of electrons, and the electrons in $x > 0$ are retained by the steady magnetic field $H(x)$. The magnetic field becomes homogeneous at some distance from $x=0$, and the unperturbed electron distribution function is Maxwellian. Furthermore, it is assumed that the ratio of plasma pressure to magnetic pressure $\mu_0 = 2T\omega_0^2/mc^2\omega_H^2 = 8\pi NT/H_0^2 \ll 1$, and the terms of the order of μ_0^2 can therefore be neglected. The field being at

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Electromagnetic Waves in a Semispace Filled With Plasma

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a larger distance from x=0 is shown to have the form of a plane wave. This wave has a propagation constant that can be obtained from the equation for an infinite plasma. The reflection and transmission coefficients are calculated for a plane wave striking the plasma from vacuum. There are 6 Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: April 27, 1960

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29313
S/109/61/006/010/011/027
D201/D302

24.6716
26.2321

AUTHORS: Dnestrovskiy, Yu.N., and Kostomarov, D.P.

TITLE: A certain non-linear problem of the theory of electromagnetic waves in plasma

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 10, 1961, 1667 - 1669

TEXT: The authors consider the electromagnetic waves propagated in a magneto-active plasma. The waves are propagated perpendicularly to the external magnetic field H_0. H_0 is assumed to be homogeneous and the electromagnetic vector polarized along it (ordinary wave). If x-axis is parallel to the direction of propagation and the z-axis parallel to the filed H_0, the process is then described by

$$\frac{\partial f}{\partial t} + v \cos \delta \frac{\partial f}{\partial x} \text{[illegible]} \omega_H \frac{\partial f}{\partial \delta} + \frac{e}{m} E(t, x) \frac{\partial f}{\partial u} = 0 \qquad (1)$$

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$$\frac{\partial^2 E}{\partial x^2} - \frac{1}{c^2}\frac{\partial^2 E}{\partial t^2} = \frac{4\pi}{c^2}\frac{\partial j}{\partial t} = \frac{4\pi e}{c^2}\frac{\partial}{\partial t}\int_0^{2\pi} d\delta \int_0^{\infty} v dv \int_{-\infty}^{\infty} uf\, du. \qquad (2)$$

In it v, δ, u - cylindrical coordinates in the velocity space, $f = f(t, x, v, \delta, u)$ - electron distribution function $\omega_H = eH_0/mc$ - the Larmor frequency: $E(t, x) = E_z(t, x)$; $j(t, x) = j_z(t, x)$. The general solution of Eq. (1) is

$$f = f(v, g_2, g_3) \qquad (3)$$

an arbitrary function of g_1, g_2, g_3 (the first integrals of the characteristic system of Eq. (1), where f - an arbitrary positive function of its parameters and integrated over infinite limits in the velocity space and even with respect to g_3. If the distribution function depends explicitly on g_2 - the plasma is inhomogeneous and a stationary current must flow parallel to the y-axis which results in an additional inhomogeneous stationary magnetic field in the z-direction and may be compensated for by the inhomogeneities of the plasma pressure. Thus, from Eqs. (1) and (2) the current in the z-direction may be evaluated as

$$j(t, x) = e\int_0^{2\pi} d\delta \int_0^{\infty} v dv \int_{-\infty}^{\infty} f(v, g_2, g_3)\, u du =$$
$$= \frac{e^2}{m}\int_0^{2\pi} d\delta \int_0^{\infty} \varphi\left(v, x + \frac{v}{\omega_H}\sin\delta\right) v dv \int_{t_0}^{t} E\left[\tau, x + \frac{v}{\omega_H}\sin\delta - \right.$$
$$\left. - \frac{v}{\omega_H}\sin(\delta + \omega_H t - \omega_H \tau)\right] d\tau. \quad (4)$$

where

$$\varphi\left(v, x + \frac{v}{\omega_H}\sin\delta\right) = \int_{-\infty}^{\infty} f\left(v, x + \frac{v}{\omega_H}\sin\delta, u\right) du. \quad (5)$$

From (4) and (2) the linear integro-differential equation

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A certain non-linear problem ...

$$\frac{\partial^2 E}{\partial x^2} - \frac{1}{c^2}\frac{\partial^2 E}{\partial t^2} = \frac{4\pi e^2}{mc^2}\frac{\partial}{\partial t}\int_0^{2\pi} d\delta \int_0^\infty \varphi\left(v, x + \frac{v}{\omega_H}\sin\delta\right) v dv \times \tag{6}$$

$$\times \int_{t_0}^{t} E\left[\tau, x + \frac{v}{\omega_H}\sin\delta - \frac{v}{\omega_H}\sin(\delta + \omega_H t - \omega_H \tau)\right] d\tau.$$

for the field E(t, x) is obtained, which for the monochromatic wave becomes

$$\frac{d^2 E}{dx^2} + k^2 E = \frac{2\pi e^2}{mc^2}\frac{\frac{\omega}{\omega_H}}{\sin\frac{\omega}{\omega_H}\pi}\int_0^{2\pi} d\delta \int_{\delta-2\pi}^{\delta} e^{i\frac{\omega}{\omega_H}(\alpha-\delta+\pi)} d\alpha \times \tag{8}$$

$$\times \int_0^\infty \varphi\left(v, x + \frac{v}{\omega_H}\sin\delta\right) E\left[x + \frac{v}{\omega_H}(\sin\delta - \sin\alpha)\right] v dv.$$

Basically Eq. (8) is similar to the corresponding equation of the linearized system. The RHS of Eq. (8) tends to infinity for frequencies ω-multiples of the Larmor frequency ω_H. In this case the

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harmony movement of electrons goes into resonance with the oscillations in the wave field. In the vicinity of the resonant frequencies the effect of the wave electric field upon the electron distribution function becomes noticeable so that the solution of the problem as based on the linearization of the kinetic equation cannot be used any more. It is stated in conclusion that there exists one more case when the problem formulated in its non-linear form leads to the same equation for the field as that of the linear problem by R.Z. Sagdeyev (Ref. 2: Fizika plazmy i problema upravlyayemykh termoyadernykh reaktsiy (Physics of Plasma and the Problem of Controlled Thermo-Nuclear Reactions) (Symposium). Izv. AN SSSR, 1958, 4, 422). It is of interest to note that in both cases the wave is purely transversal. When the electric vector is longitudinal, the field equation is non-linear and the process of linearization leads to a different equation. There are 2 Soviet-bloc references.

ASSOCIATION: Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta im. M.V. Lomonosova (Moscow State University im. M.V. Lomonosov, Department of Physics)

SUBMITTED: February 22, 1961

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B109/B212

AUTHORS: Dnestrovskiy, Yu. N., Kostomarov, D. P.

TITLE: Dispersion equation for an ordinary wave traveling in a plasma transversely to an external magnetic field

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40, no. 5, 1961, 1404-1410

TEXT: The properties of the dispersion equation are discussed from the mathematical point of view. If $\omega_H = eH_0/mc$ denotes the Larmor frequency and $\omega_0 = \sqrt{4\pi Ne^2/m}$ the plasma frequency, then the dispersion equation for the ordinary wave is known to have the form

$$D(k,\omega) = k^2 - \frac{\omega^2}{c^2} + \frac{\omega_0^2\omega}{2c^2\omega_H \sin(\pi\omega/\omega_H)} \int_0^{2\pi} \exp\left\{-\frac{Tk^2}{m\omega_H^2}(1-\cos\tau)\right\} \times$$

$$\times \cos\frac{\omega}{\omega_H}(\tau-\pi)\,d\tau = 0. \qquad (1)$$

and, for the dimensionless quantities

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Dispersion equation for an ordinary ...

$$s = k^2c^2/\omega^2 = N^2, \quad \alpha = \omega/\omega_H, \quad \beta = \omega_0/\omega_H, \quad \gamma = T/mc^2,$$

(where N denotes the index of refraction).

$$\mathcal{D}(s, \alpha, \beta, \gamma) = s - 1 + \frac{\beta^2}{2\alpha \sin \alpha\pi} \int_0^{2\pi} \exp\{-s\alpha^2\gamma(1-\cos\tau)\} \cos\alpha(\tau-\pi)\, d\tau = 0. \quad (2)$$

For $\omega > \omega_0$, $\omega \neq n\omega_H$ (1) always has a pair of real roots $\pm k(\omega)$. Figs. 1 and 2 show the quantitative results; Fig. 1 shows the index of refraction as a function of the frequency at $\beta = \sqrt{0.5}$ for different values of γ; Fig. 2 shows the same at $\beta = \sqrt{5}$; positive roots are shown above the axis of ordinate, and negative ones below it. For $\omega < \omega_0$ near the resonance frequencies ranges $\overline{\alpha}_n(\beta, \gamma) < \alpha < n$, where (2) has two positive roots. If $\alpha \to n - 0$, one of these roots tends toward zero, and the other toward $+\infty$. Outside these ranges (1) shows no real roots for $\omega < \omega_0$. For $\omega < \omega_0$ there are ranges near the resonance frequencies, where (1) has neither real nor imaginary roots. But (1) has an infinite number of complex root quadruples $k = p_n(\omega) \pm iq_n(\omega)$, $k = -p_n \pm iq_n$.

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for any value of $\omega \neq n\omega_H$. If ω has to be calculated as a function of real wave numbers k ($\omega = \omega(k)$), then it is necessary to determine the intersections of the lines $N = kc/\omega_H\alpha$ (dotted line in Figs. 1 and 2) with the function $N = \sqrt{s(\alpha, \beta, \gamma)}$ in order to find the real roots of (1). A pair of roots $\omega = \pm\omega_H\alpha^*$ of Eq. (1) corresponds to each point α^*, N^*. An analysis shows that the number of intersections is infinite. Numbering the abscissae of these points according to their increase ($\alpha < \alpha_2 < \alpha_3 < \ldots$) indicates the following rules: 1) The values of α_n are between $n - 1 < \alpha_n < n$ ($n = 1,2,3, \ldots$); 2) one of the abscissae α_{n_0} is located close to the abscissa of the intersection of the lines $N = kc/\omega_H\alpha$ and $N = \sqrt{1 - \beta^2/\alpha^2}$, i.e., $\alpha_{n_0} \approx \sqrt{\beta^2 + (kc/\omega_H)^2}$; 3) for $1 \leqslant n \leqslant n_0$ one has $\alpha_n \approx n$, and for $n_0 < n < \infty$ $\alpha_n \approx n - 1$. While Eq. (1) will have an infinite number of pairs of real roots $\pm\omega_n(k)$ at any real value of k, there are no complex roots.

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There are 2 figures and 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

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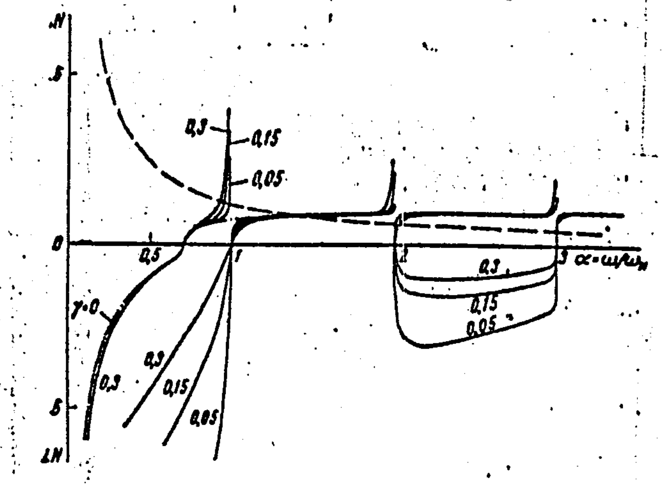

Fig. 1.

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9.9845
26.2331

AUTHORS: Dnestrovskiy, Yu. N., Kostomarov, D.P.

TITLE: The dispersion relation for an extraordinary wave propagating in a plasma transversely to an external magnetic field

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 5(11), 1961, 1527 - 1535

TEXT: In a previous paper (ZhETF, 40, 1494, 1961) the authors have investigated the ordinary wave propagating in an unbounded homogeneous plasma. In the present paper, analogous calculations are carried out for the extraordinary and the plasma waves. For these waves the electric vector is polarized perpendicularly to the strength $\vec{H}_0$ of the external magnetic field. The dispersion relation which is investigated reads as follows: $D(k,\omega) = k^2\varepsilon_{11} - \omega^2 c^{-2}(\varepsilon_{11}\varepsilon_{22} - \varepsilon_{12}\varepsilon_{21}) = 0$ (1), $\varepsilon_{ij}(k,\omega)$ are the components of the dielectric constant. In the nonrelativistic case ... Maxwellian electron distribution function is used.